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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|-------------------------------|---------------------|------------------|
| 09/543,284 | 04/05/2000 | Boris Dmitrievich Lubachevsky | Lubachevsky-10-2 | 6481 |

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Henry T Brendzel
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Springfield, NJ 07081

02/14/2006

EXAMINER

STEVENS, THOMAS H

ART UNIT PAPER NUMBER

2123

DATE MAILED: 02/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/543,284

Applicant(s)

LUBACHEVSKY ET AL.

Examiner

Thomas H. Stevens

Art Unit

2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: 37 CFR 1.105.

DETAILED ACTION

1. Claim 1-24 were examined.

Section I: Reopening Prosecution

2. In view of the appeal brief filed on 11/14/05 , PROSECUTION IS HEREBY REOPENED. A new ground of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options: (1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or, (2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2). Reopening is necessitated based on applicants' argument in the brief. Based on applicants' brief and interpretation, examiner has provided new art and looks forward to advancing prosecution.

Section II: Non-Final Rejection

Claim Interpretation

3. Office personnel are to give claims their "**broadest reasonable interpretation**" in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited

in the claim are not read into the claim. *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). See *also *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) ("During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow") The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process.

4. Per MPEP 2131.02 Genus-Species Situations: "A generic claim cannot be allowed to an applicant if the prior art discloses a species falling within the claimed genus." The species in that case will anticipate the genus. *In re Slayter*, 276 F.2d 408, 411, 125 USPQ 345, 347 (CCPA 1960); *In re Gosteli*, 872 F.2d 1008, 10 USPQ2d 1614 (Fed. Cir. 1989) (Gosteli claimed a genus of 21 specific chemical species of bicycle bicyclic thia-aza compounds in Markush claims. The prior art reference applied against the claims disclosed two of the chemical species. The parties agreed that the prior art species would anticipate the claims unless applicant was entitled to his foreign priority date.). The Office declares the exponential function "e" as the genus to which the prior art depicts the species i.e., log parallel process equation.

5. Communication is shared information to which the PE's determine as described within pg. 2, lines 12-17 of the specification.

6. Definition of module (from www.dictionary.com): Computer Science. A portion of a program that carries out a specific function and may be used alone or combined with other module of the same program.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

8. Claims 22-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The "storage element" is indefinite since it could be a plastic container for example.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Lubachevsky "Almost Linear Speed-Up Distributed Discrete Event Simulation" 1988. Lubachevsky discloses a new distributed simulation algorithm, which explores the topology of the simulated system using precomputed minimum propagation delays between subsystems (pg.188, right column, 4th paragraph "all nodes I within a subnetwork").

Claim 1: A method executed in hardware simulating events comprising the steps of: assigning events in a physical system comprising the steps of: assigning events of said physical system that are to be simulated to each of the processing elements (PEs); and said N PEs (pg.187, Introduction, left column, 3rd paragraph) simulating events in parallel, in a simulation step where each processing element (PE) (pg.187, Introduction, left column, 3rd paragraph) simulates assigned events in blocks of M edge (Office equivocates bound and edge; pg. 188, left column, last paragraph) events, where M is approximately a $\log_e N$, e is approximately 2.71828 (see claim interpretation) and an edge (Office equivocates bound and edge; pg. 188, left column, last paragraph) event is an event whose simulation in a processing element is directly affected by information originating in another processing element(pg.187, Introduction, left column, 3rd paragraph with pg. 188, figure 3.1, syntax lines 4-5).

Claim 2: The method of claim 1 where each of said simulation steps comprises one or more iterations (pg.187, Introduction, left column, 3rd paragraph).

Claim 3: The method of claim 2 where each iteration comprises a simulation phase followed by a communication phase and an assessment phase (synchronization phase: pg. 188, left column, 1st paragraph and pg. 189, left column, last paragraph “modify the code”).

Claim 4: The method of claim 3 where, in each communication phase, each of said PEs shares information with one or more other PEs from said N PEs, which information is needed by said other PEs to simulate edge (Office equivocates bound and edge; pg. 188, left column, last paragraph) events of said other PEs .

Claim 5: The method of claim 4 where said information shared by each PE in a communication phase of an iteration is related to events simulated by said each PE in said iteration (see claim interpretation with pg. 188, left column, 2nd paragraph “PE_i process its events one at a time”).

Claim 6: The method of claim 4 where said assessment phase carried out by each of said PEs comprises the steps of determining whether the existence of a simulation error (delays in processing are considered errors; pg. 188, left column, 7th paragraph) can be excluded and directing that another simulation iteration is to take place when the existence of a simulation error cannot be excluded.

Claim 7: The method of claim 6 further comprising a floor advancement step, that is carried out when said step of determining, in said assessment phase concludes that there are no simulation errors iteration, where the advancement step advances a simulation floor time (pg. 189, right column, 2nd box "the processing range floor...") of a present simulation step to form a modified simulation time floor, for simulating another block of M events (pg. 190, left column, 3rd paragraph) in a next simulation step.

Claim 8: The method of claim 6 further comprising a step of advancing a simulation floor time from a simulation floor time of a present simulation step, to form a modified simulation floor time, for starting from said modified simulation floor time the simulation of another block of M events (pg. 190, left column, 3rd paragraph) in a next simulation step, when said step of determining in said assessment phase concludes that there are no simulation errors in said present simulation step.

Claim 9: The method of claim 8 where said modified simulation floor time corresponds, to the earliest simulation time of the Mth edge (Office equivocates bound and edge; pg. 188, left column, last paragraph) event simulated by said N PEs in said present simulation step.

Claim 10: The method of claim 4 where events are simulated seriatim (another series; pg. 190, left column, 4th paragraph) in each simulation phase.

Claim 11: The method of claim 10 where for simulating a second event ("many events"; pg.187, left column, 4th paragraph) following a simulation of a first event, a time interval is identified between a simulation time of said first event and a simulation time of said second event, and said second event is identified for simulation.

Claim 12: The method of claim 11 where said second event("many events"; pg.187, left column, 4th paragraph) is identified for simulation following a step of accounting for simulation of said first event and simulation of events in said other PEs from said N PEs.

Claim 13: The method of claim 12 where said accounting is based on present knowledge (Office equivocates bound and edge; pg. 188, left column, last paragraph) of states of said other events.

Claim14: The method of claim 12 where said accounts for simulation of events ("many events"; pg.187, left column, 4th paragraph) in said other PEs from said N PEs accounts for events simulated during said time interval.

Claim15: The method of claim 11 where said second event ("many events"; pg.187, left column, 4th paragraph) is identified by employing a first random number(pg. 190, left column, 4th paragraph).

Claim 16: The method of claim 11 where said time interval is identified with a second random number (pg. 190, left column, 4th paragraph).

Claim 17: The method of claim 16 where said second random number is set to said first random number (pg. 190, left column, 4th paragraph).

Claim 18: The method of claim 15 where said first random number is derived from a random variable having a uniform distribution (Gaussian Distribution; well known within probability) .

Claim 19: The method of claim 15 where the serially (another series; pg. 190, left column, 4th paragraph) simulation of each event in said block of M events (pg. 190, left column, 4th paragraph), in a first iteration starting from a given simulation floor time, employs an independently derived random number from said random variable, forming thereby a sequence of random numbers, and simulation of said block of M events in all subsequent iterations starting from said given simulation floor time employs said sequence of random numbers.

Claim 20: The method of claim 18 where the sequence of random numbers (pg. 190, left column, 4th paragraph) employed in one simulation step is different from a sequence of random numbers employed in another simulation step.

Claim 21: Apparatus that includes N interacting processing elements (PEs), the improvement characterize by: each of said N PES storing a specification of a subsystem (pg.188, right column, 4th paragraph "all nodes I within a subnetwork") of a system composed of interacting subsystems; and said N PEs (a) executing a selected number of simulation steps, and in each simulation step each of said PE's simulates a block of operational events of its associated subsystem, (pg.188, right column, 4th paragraph "all nodes I within a subnetwork") where a block contains M edge (Office equivocates bound and edge; pg. 188, left column, last paragraph) events, when M is approximately equal to $\log N$, and an edge (Office equivocates bound and edge; pg. 188, left column, last paragraph) event is an event whose simulation in a processing element is directly affected by information originating in another processing element, and (b) outputting results of the simulations (pg. 187, "Time Logic Simulation" section, 1st paragraph, 1st sentence).

Claim 22: A storage element comprising: a first module (see claim interpretation; e.g., figures 3.1 and 3.2 pg.188) that when executed in a processor, simulates operational events of a stored subsystem (pg.188, right column, 4th paragraph "all nodes I within a subnetwork") that is part of a system of interacting subsystems, (pg.188, right column, 4th paragraph "all nodes I within a subnetwork") primarily in blocks that contain M edge (Office equivocates bound and edge; pg. 188, left column, last paragraph) events, in addition to non-edge (Office equivocates bound and edge; pg. 188, left column, last paragraph) events, where M is approximately equal to $\log N$, and an edge (Office

equivocates bound and edge; pg. 188, left column, last paragraph) event is an event whose simulation in a processing element is directly affected by information originating from simulations by another module (see claim interpretation; e.g., figures 3.1 and 3.2 pg.188) that is substantially the same as said first module (see claim interpretation; e.g., figures 3.1 and 3.2 pg.188), which other module (see claim interpretation; e.g., figures 3.1 and 3.2 pg.188) is executed in another processor; and a second module (see claim interpretation; e.g., figures 3.1 and 3.2 pg.188) that outputs simulated operational events resulting from execution of said first module (see claim interpretation; e.g., figures 3.1 and 3.2 pg.188).

Claim 23: The storage elements of claim 22 further comprising a third module (see claim interpretation; e.g., figures 3.1 and 3.2 pg.188) that communicates with said module (see claim interpretation; e.g., figures 3.1 and 3.2 pg.188).

Claim 24: The storage element of claim 23 further comprising a forth module (see claim interpretation; e.g., figures 3.1 and 3.2 pg.188) that assesses whether, based on information received by said third module (see claim interpretation; e.g., figures 3.1 and 3.2 pg.188), any of said M edge (Office equivocates bound and edge; pg. 188, left column, last paragraph) events need to be-resimulated (pg. 188, left column, 6th paragraph).

Citation to Relevant Prior Art

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Lubachevsky-B.D., "Several Unsolved Problems in Large-Scale Discrete Event Simulations" 1993 ACM pg.60-67; teaches several mathematical and algorithmic problems that have arisen in discrete event simulations of large systems.
- Misra-J., "Distributed Discrete-Event Simulation" 1986 ACM pg.39-65; teaches traditional discrete-event simulations to solve the problem of simulating physical systems.
- Cota et al., "An Algorithm for Parallel Discrete Event Simulation Using Common Memory" 1989 ACM, pg.23-31; teaches parallel event discrete simulation.

Duty to Disclose All Prior Art

12. A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration

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need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information, which is not material to the patentability of any existing claim. **The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by 1.97(b)-(d) and 1.98.** However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct.

Examiner requests applicant to provide complete copies of the following literature:

- Lubachevsky-B.D. *"Bounded Lag Distribution Discrete Event Simulation"* SCS Multiconference on Distributed Simulation; San Diego, CA; (USA); 3-5 Feb. 1988. pg.183-192.
- Lubachevsky -B.D. *"Efficient Distributed Event Driven Simulations of Multiple Loop Networks"*. Proceedings of the 1988 ACM SIGMETRICS Conference on Measurement and Modeling of Computer Systems, May (1988), Santa Fe, New Mexico, pp.12-21.
- Lubachevsky -B.D., *"Efficient Parallel Simulations of Dynamic Ising Spin Systems"*. Journal of Computational Physics, 75, 1 (Mar 1988), pp.103-122.


Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mr. Tom Stevens whose telephone number is 571-272-3715, Monday-Friday (8:00 am- 4:30 pm EST).

If attempts to reach the examiner by telephone are unsuccessful, please contact examiner's supervisor Mr. Leo Picard ((571) 272-3749). The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Answers to questions regarding access to the Private PAIR system, contact the Electronic Business Center (EBC) (toll-free (866-217-9197)).

February 4, 2006



**LEO PICARD
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100**

TS

2120

2121 Knight

1ST Reviews OverDue:

| Mail Date | Serial # | Art Unit | Examiner |
|-----------|------------|----------|----------|
| 1/12/2006 | 10/076,635 | 2128 | FREJD |

Total = 1 Reviews

1ST Reviews On Desk:

| Mail Date | Serial # | Art Unit | Examiner |
|-----------|------------|----------|----------|
| 1/20/2006 | 10/288,570 | 2125 | PALADINI |
| 1/25/2006 | 10/828,026 | 2125 | GANDHI |

Total = 2 Reviews

| | | |
|---------------------------|------|-------|
| Total Time Spent to Date: | 3.75 | hours |
|---------------------------|------|-------|

2125 Picard

2ND Reviews OverDue:

| Mail Date | Serial # | Art Unit | Examiner |
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| 10/28/2005 | 11/143,062 | 2125 | GANDHI |
| 10/31/2005 | 10/161,609 | 2125 | PALADINI |
| 11/8/2005 | 10/174,217 | 2125 | PALADINI |
| 12/14/2005 | 10/010,882 | 2125 | PALADINI |
| | 10/063,009 | 2125 | PALADINI |
| 12/15/2005 | 10/851,677 | 2125 | PALADINI |
| 12/16/2005 | 10/286,863 | 2125 | PALADINI |
| 12/19/2005 | 10/051,317 | 2125 | PALADINI |
| 12/23/2005 | 10/622,265 | 2125 | GANDHI |
| 1/9/2006 | 10/283,398 | 2125 | GANDHI |

Total = 10 Reviews

1ST Reviews OverDue:

| Mail Date | Serial # | Art Unit | Examiner |
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| 1/3/2006 | 10/336,473 | 2128 | FREJD |
| 1/12/2006 | 09/863,221 | 2128 | FREJD |

Total = 2 Reviews

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| Mail Date | Serial # | Art Unit | Examiner |
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| 1/19/2006 | | | |
| | 10/030,705 | 2125 | PALADINI |

Total = 1 Reviews

1ST Reviews On Desk:

| Mail Date | Serial # | Art Unit | Examiner |
|-----------|------------|----------|----------|
| 1/27/2006 | | | |
| | 09/975,799 | 2129 | DAVIS |
| | 11/159,474 | 2129 | DAVIS |

Total = 2 Reviews

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|---------------------------|---|-------|
| Total Time Spent to Date: | 5 | hours |
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2128 Shah

1ST Reviews OverDue:

| Mail Date | Serial # | Art Unit | Examiner |
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| 12/20/2005 | | | |
| | 10/789,440 | 2125 | PALADINI |
| 12/22/2005 | | | |
| | 10/367,986 | 2125 | GANDHI |
| 12/23/2005 | | | |
| | 10/114,248 | 2125 | GANDHI |
| 1/9/2006 | | | |
| | 10/373,675 | 2125 | GANDHI |

Total = 4 Reviews

1ST Reviews On Desk:

| Mail Date | Serial # | Art Unit | Examiner |
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| 1/18/2006 | | | |
| | 10/069,189 | 2125 | PALADINI |
| 1/24/2006 | | | |
| | 10/039,188 | 2125 | PALADINI |

Total = 2 Reviews

2129 Vincent

1ST Reviews On Desk:

| Mail Date | Serial # | Art Unit | Examiner |
|-----------|------------|----------|----------|
| 1/23/2006 | | | |
| | 10/746,994 | 2125 | GANDHI |
| 1/27/2006 | | | |
| | 09/833,823 | 2125 | PALADINI |

Total = 2 Reviews

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| Total Time Spent to Date: | 0.75 | hours |
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